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SELF-DIRECTION IN PROGRAMED GEOGRAPHY INSTRUCTION.

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AS PART OF A PROJECT TO IMPROVE PROGRAMED INSTRUCTION BY GIVING THE STUDENT MORE FREEDOM OF CHOICE AND RESPONSBILITY FOR LEARNING, THIS FIELD-TYPE EXPERIMENT EXPOSED 178 STUDENTS IN 7 GRADE 5 AND 6 CLASSES TO LINEAR (L), AND SELF-DIRECTED (SD) PROGRAMS, AND NO-PROGRAM (NP) INSTRUCTION IN GEOGRAPHY. (SELF-DIRECTION ALLOWS THE STUDENT MAXIMUM FREEDOM IN SEQUENCE, EXTENT, AND METHOD OF STUDY.) ALSO VARIED IN THE DESIGN WAS A LIST OF PREMOTIVATING QUESTIONS GIVEN 2 CLASSES BEFORE THEY BEGAN THE PROGRAMS. STUDENTS IN BOTH L AND SD GROUPS REPORTED LITTLE DIFFERENCE IN ACTUAL STUDY PROCEDURES, THUS EXPLAINING A RESULT OF NO DIFFERENCES IN EFFECTIVENESS OF THE 2 PROGRAMS ON THE CRITERION ACHIEVEMENT TEST, AND IN MEAN STUDY TIME. THE PREMOTIVATING QUESTIONS HAD A NEGATIVE EFFECT, AND TEACHERS REPORTED A NEED FOR MORE VARIETY IN STUDY ACTIVITY, IN REFERENCE TO THE NP GROUP. THE AUTHORS POINT OUT THAT GIVING STUDENTS FREEDOM TO USE PROGRAMED MATERIALS IN ANY WAY THEY PLEASED DID NOT DETRACT FROM LEARNING. (LH)

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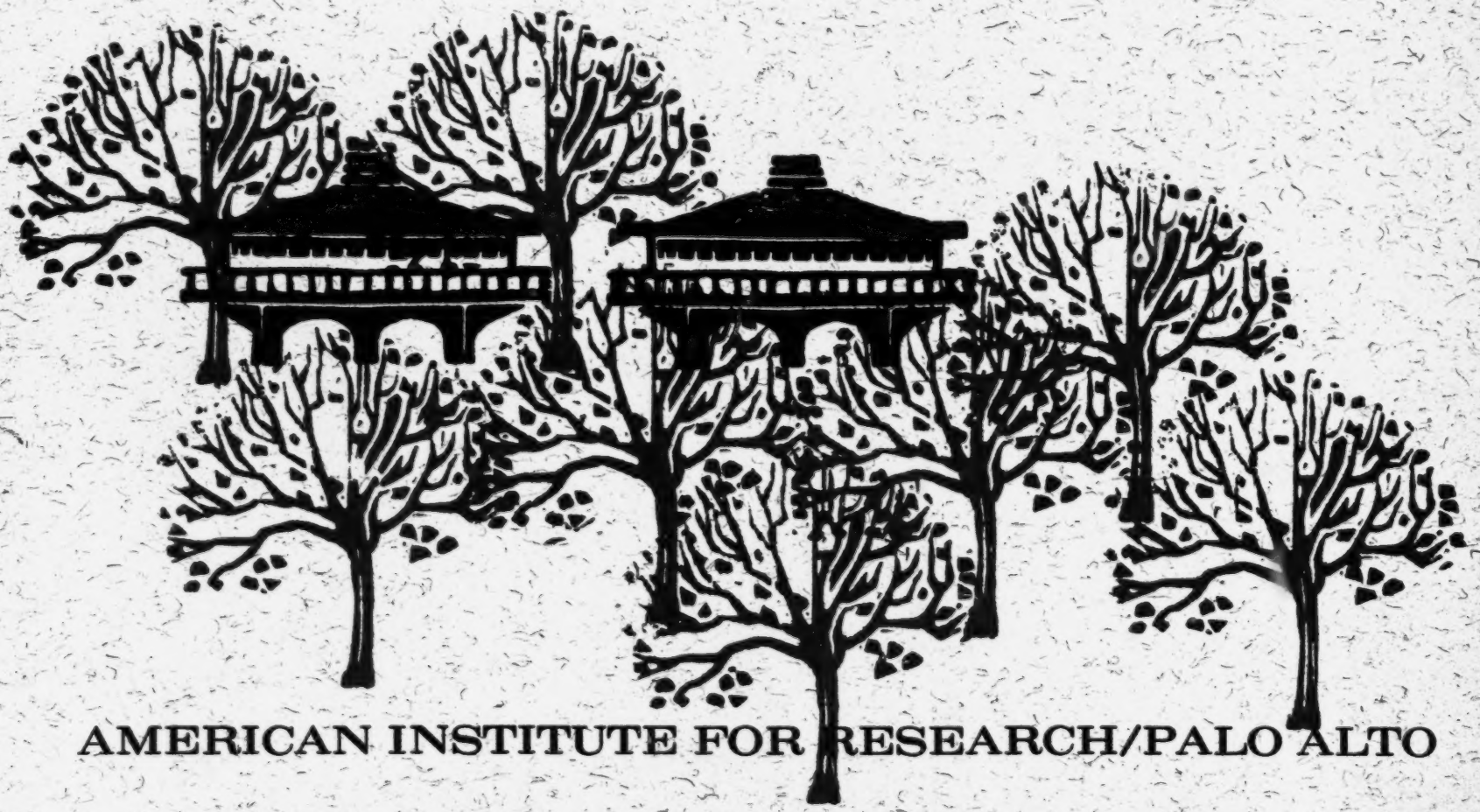

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SELF-DIRECTION IN PROGRAMED GEOGRAPHY INSTRUCTION

As research evidence and practical experience with programed self-instruction accumulate, programers and teachers are justifiably taking a more pragmatic approach in which programs are adapted in form, content and use to satisfy a particular educational requirement, judgment often being supplemented by experimental tryout and revision.

One class of variations in program usage which may have far-reaching implications is the extent to which the learner is given control over the learning situation. The present experiment is part of a project in which ways are sought of improving programed instruction by giving the student more freedom of choice and more responsibility for the learning process than is typically the case with programed instruction. Giving the student more independence has economic potentialities, but its educational effects are the main concern here. Students may at times be better able than anyone else to evaluate and direct their own learning progress. This would seem especially promising when it is important that the learner synthesize new knowledge with old, the better to retain and apply it. Giving the student more responsibility may also enhance motivation to learn and may better enable him to avoid satiation and boredom.

A final report in December, 1963, summarizing the entire project will discuss the rationale for self-direction in greater detail and will relate this experiment to similar studies.

The present experiment was a field study in several respects. The experimental classes were taught their regular curriculum by their regular teachers. The learning materials were fundamentally the same as those used in non-experimental classes during that entire year, namely, programed worksheets on principles of geography. The entire course was semi-experimental in that both content and form of the geography programs were being introduced for the first time after years of preparation by the district Director of Instruction with the aid of several social studies teachers. The present experiment modified a segment of the

course (2 to 3 weeks) in order to compare self-directed use of the programed materials with a linear study procedure (also individualized) using the same materials. In order to maximize the contrast between self-directed and linear procedures we gave the self-directed students as much freedom as we could without markedly changing the basic materials or the school schedules and regulations.

Method

Subjects

Six 6th-grade classes and one 5th-grade class from the Menlo Park Elementary School District served as Ss in this study. The seven classes comprised a total of 178 Ss. Ss within the classes were heterogeneous in academic achievement and ability.

The Regular Geography Course

The experimental units of instructions came during the latter weeks of a one-year course designed to develop a coherent knowledge of geography by a hierarchical presentation of physical factors responsible for climate, crops and other geographic conditions. Although specific geographic facts were presented by way of applications and examples, the main objective was to learn the physical and geographic principles which tied the facts together into a meaningful structure. The basic program for each unit of the course was a booklet of information and questions. The content and format of the programs are best illustrated by reference to the sample pages shown in Appendix A. As can be seen there, student response is called for frequently, and primarily in multiple-choice format. Correct answers did not appear anywhere on the program booklet itself, because in regular classroom use that year the teacher answered and discussed each item with the whole class after the students had spent a few minutes working on the item individually.

Several items in each unit referred the student to an atlas (Hammond, 1962) to which all students had access. A globe and other general schoolroom references were also available. Finally, each student had a "fact sheet" listing the main facts and principles of an entire unit on one to two pages. Examples of facts listed:

2. Compressed air has more pressure (weight) than expanded air.
9. Horse Latitude regions near cold ocean currents are deserts unless there are mountains near the coast.
11. Southern California has Mediterranean Climate.

During regular instruction the fact sheets were used primarily for review after completion of a unit.

A study guide (Appendix B) quite similar to the fact sheet was used only by the teacher during regular instruction. It summarized in a page or two the main ideas of a unit.

The Experimental Treatments

The two experimental units of the course, covered in approximately two or three weeks total time, dealt with Mediterranean and Monsoon Climates, in that order. The basic program for the Mediterranean unit was 18 pages long (see Appendix A for sample pages), the Monsoon unit 16 pages. Whereas regular instruction was teacher-led and group-paced, the experimental treatments of these two units were completely individualized, though every S was free to consult the teacher at any time.

Linear (L). The linear method required each S to follow a particular sequence of steps, at his own pace. In addition to the regular materials described above, each S had an answer booklet, which gave the correct answers for all program items and in some cases gave additional elaboration. Each point on the study guide (Appendix B) appeared on a green page in the white answer booklet at the end of the series of items which it covered, thereby serving to summarize that series and emphasize the main ideas. (The intact study guide was used only by the teacher.)

Ss were instructed to answer every program item and check the answer immediately, also reading any supplementary information presented in the answer booklet for that item. All references to the atlas were to be followed through. In short, each step in the study sequence was fixed and the same for all Ss.

Self-directed (SD). The study materials available in the SD method were the same as those of the linear method with the exception that the study guide, instead of appearing point by point throughout the answer

booklet, was kept intact and could be used by S at any time to help him organize his own study. Ss were allowed to use all materials in any way they wished in order to learn the lesson; that is, within the constraints imposed by the classroom situation and materials available, Ss had their choice of study procedure, including the freedom to consult with other Ss quietly, to review at any time, to respond or not, to look at the answer before the question, or whatever.

No-program, self-directed (NP). Although the comparison of main interest initially was between the SD and L treatments, we could not help noting the mounting evidence (e.g., Angell & Terry, 1962; Swets, et al., 1963; Goldbeck & Campbell, 1962) that for direct acquisition and retention of specifics the most efficient learning method was usually that which presented S the information to be learned as starkly and simply as possible. The study guide and fact sheet for each unit presented the basic information in the unit quite concisely, so we included a treatment (NP) in which neither program nor answer booklet were provided to S. Only the study guide, fact sheet, atlas, globe, and general classroom references were available, but these could be used in any manner whatsoever. Ss were free to consult each other and the teacher individually.

Design and Procedure

The basic design for comparing self-directed and linear instruction involved four of the 6th-grade classes, each class getting the self-directed program for one unit and the linear program for the other unit. All Ss studied the Mediterranean unit first, two classes studying it by the self-directed (SD) method and two by the linear (L) method. The classes then switched methods for the Monsoon unit. In one of each pair of classes having the SD and L treatments in the same order, every S was given a list of questions prior to beginning each program. These questions were designed to stimulate interest in the material to be studied and to provide some motivation for learning the material. These "premotivating" questions are shown for one unit in Appendix C.

One 6th-grade class was given the no-program (NP) treatment for both units. It was anticipated that if the NP treatment taught efficiently,

a crucial question remaining might be how long such a method would be endurable to the students and the teacher. Continuing the treatment for both units, we thought (correctly as it turned out), might reveal cumulative effects of fatigue or satiation.

The remaining 6th-grade class and the 5th grade class were given regular instruction for both the Mediterranean and Monsoon Units. The only novelties for these Ss were the special criterion tests given to all classes and the rare appearance of the researchers.

The six 6th-grade classes were randomly assigned the six treatments described. The 5th-grade class given regular instruction was chosen because it happened to be ready for the Mediterranean Unit shortly after the experiment planned for the 6th grade was started. The design of treatments given the seven classes is summarized below:

		Mediterranean Unit		Monsoon Unit	
Class	Grade	Premotivating Questions?	Learning Method	Premotivating Questions?	Learning Method
1	6th	yes	SD	yes	L
2	6th	yes	L	yes	SD
3	6th	no	SD	no	L
4	6th	no	L	no	SD
5	6th	no	NP	no	NP
6	6th	no	Regular	no	Regular
7	5th	no	Regular	no	Regular

All classes were given a 40-item criterion test on the Mediterranean unit and a 35-item test on the Monsoon unit. Most of the test items required only recognition of the facts and principles stated in the lesson. Five or six items in each test asked questions about the climates on a hypothetical continent, which required some degree of transfer.

In experimental classes only, (SD, L, NP) every S knew from the start that if he failed to score 75% the first time he took the test he would have to go through the program again in the same manner (Ss were

not given the corrected tests to study). Following this recycle the S took a "parallel" form of the criterion test which differed from the first form only in the map of the hypothetical continent.

In the self-directing treatments (SD and NP) S was free to take a criterion test whenever he felt ready. In the linear method the test was given immediately after S completed the program the first time and again after completing it the second time, for those Ss who did so. Under regular instruction all Ss were given the test at the same time (on completing the unit) and no recycling procedure was used. In all treatments every S took the test at least once.

In all classes, except Nos. 1 and 7, each S was asked to predict his test score at the time he took the test (just before the test for 2 classes, just after for the others), as an index of the validity of general self-evaluation of learning progress. Ss were allowed to use the fact sheet as an aid for their prediction.

Between one and two weeks after completing each unit, a retention test was given to all Ss in 4 of the classes (the other 3 completed the experimental units too near the end of the school year). This test was the same as the immediate posttest given previously. The Mediterranean test was administered 5 months later to the 75% of the Ss who were still available from classes 4 (L), 5 (NP), and 6 (regular).

Results

Immediate Posttests and Study Time

Classes 1 to 4 in which each S got both the SD and L treatments represented a design in which individual differences between Ss did not obscure method effects. Despite this sensitivity there were no significant differences between the L and SD methods on criterion tests taken during or immediately after learning, nor were there differences in mean time spent studying under the two methods. The effect of pre-motivating questions on subsequent learning was also apparently negligible. The time and test score means are shown in Table 1. Summaries of these analyses of variance for the first posttest appear in Appendix D.

Table 1

Scores on the First and Last Immediate Posttests and Mean Study Time (Min.). (Within either premotivating condition, every mean involves the same Ss since L and SD methods were counterbalanced for the 2 units.)

	Method	First Posttest Taken		Last Posttest Taken	
		Score	Study Time	Score	Study Time
Premot. Ques.	SD	25.7	105	27.1	117
(Classes 1 & 2)	L	28.1	116	29.0	126
No Premot. Ques.	SD	28.9	125	30.6	140
(Classes 3 & 4)	L	28.1	120	29.7	137

Table 2

Mean Criterion Test Score and Study Time (Min.) for the First Posttest (Mediterranean and Monsoon Units Pooled) and Mean CAT-Reading Score, for Each Class.

		First Posttest Score		CAT	Study
Class No.	Method	Unadjusted	Adjusted by CAT	Score	Time
1	Individual-ized Program	50.6	49.5	86.0	280
2	"	55.3	54.1	86.3	161
3	"	58.2	58.0	83.8	208
4	"	55.0	55.6	81.9	305
5	No Program (NP)	53.5	53.4	83.7	112
6	Regular	66.6	62.9	92.5	366
7	Regular (5th grade)	54.8	59.1	72.9	396

The other principal analyses of test scores and time involved treatment comparisons among all seven classes. Since there was no SD - L difference, data from the Mediterranean and Monsoon units were pooled yielding one mean for each class on each dependent variable as shown in Table 2. Classes 1 to 4 (SD, L treatments) could now be called "individualized program" classes, as compared to the no-program (NP) class and the regular instruction classes.

Analysis of covariance of scores on the first criterion test, with CAT Total Reading score as the control variable, yielded a significant ($p < .001$) overall difference among classes. (The first test taken on each unit was used for the experimental classes because the regular-instruction classes had only one opportunity to take the test. Results were quite similar for the final test scores.) As can be seen in Table 2, classes 6 and 7, which had regular group instruction, learned more ($p < .001$) than the experimental classes, but they also took more time ($p < .001$). The no-program (NP) class did not differ significantly in amount learned from the individualized program classes (Nos. 1 to 4), but the NP class took only about 60% as much time as the individualized program classes averaged together.

Retention Tests

The classes (Nos. 1, 2, 3, 6 and 7) which took a retention test between one and two weeks following completion of each unit dropped about 2% in criterion test score, with no appreciable differences among classes in retention loss.

The five-month retention test over the Mediterranean Unit showed a mean drop of 6% from the first criterion test for all three classes (Linear, NP and regular). When the retention test means were adjusted by CAT Reading score there were negligible differences in final level of retention among these three groups, even though the no-program self-directing group (NP) spent less than half as much time as either of the others in original learning.

In addition to the regular criterion test a brief transfer test requiring more thoughtful application of what had been learned was given

to classes 4 and 5. The Monsoon transfer test was given immediately after initial learning and the Mediterranean version at the time of five-month retention testing. The two classes did not differ significantly on either transfer test.

Attitudes and Comments

A one-page questionnaire (Appendix E), given at the completion of the experimental units to the four individualized program classes, asked S to compare the SD and L methods. Responses showed a definite preference ($p < .001$) for self-direction over linear programed instruction (65 preferred SD, 24 preferred L, and 18 were neutral). They also tended ($p < .10$) to report that they learned faster by the SD method.

The voluntary comments of Ss in these four classes, as recorded on the questionnaire and as noted by the teachers during class, indicated a variety of reasons for preferring self-direction. Those mentioned most frequently were the feeling that they could make their own choice of activity at any time, and being able to go back and review with the help of the study guide. Their appreciation of freedom of choice itself is especially interesting in view of the fact that most teachers and several Ss reported that they (the Ss) followed almost the same procedure in the SD unit as in the linear unit. If so, it is not surprising that no great differences in time and performance resulted, even though most Ss preferred self-direction. In one class only, the most frequent factor mentioned in favor of the SD method was being able to ask other Ss questions and answer theirs. This teacher may have encouraged such conferences more than the other teachers. The minority who preferred the linear method mentioned as reasons for their preference that the linear method was easier and that they needed its discipline.

The teachers of these four classes were also given a brief open-end questionnaire and their answers indicated that three of the four preferred the linear method. The one who preferred the SD method thought he was utilized more by the students, but he thought the teacher essential in building enthusiasm for a topic and for occasional advice and

guidance. The three who did not like the SD method all mentioned confusion and wasted time for both students and teacher as a factor.

A tape-recorded conference with all teachers at the end of the experiment generally confirmed the attitudes expressed on the questionnaire. All teachers who had individualized study treatments (SD, L, NP) mentioned that the students would need more variety in a whole year course than was provided by the experimental methods. The revised geography course now being taught (1963-64) does in fact permit more variation in study activity.

The NP class was given a special questionnaire asking them to rate their study method on a 4-point scale from "I liked it" to "I didn't like it." Most Ss differentiated between the first and second units. Whereas attitudes were overwhelmingly favorable (24 to 3) on the first unit, on the second unit the rating was predominantly negative (10 to 17). This difference may be partly attributable to the approaching end of the school year, the Monsoon unit coming in the last week of school. But the teacher's opinion was that both she and the students became satiated and worn down from the intensiveness of having the students use the study guide alone, even with occasional consultation of the teacher or a reference.

Correlations Among Dependent Variables

As we had found in previous studies with individualized or programed instruction, study time correlated negligibly with criterion test scores within each method, even though mean test score for each method tended to correspond with mean time spent under that method. The CAT scores used in the analyses of covariance correlated moderately (.30 to .70) with criterion test scores.

Correlations within each class between predicted (by S) and obtained test scores were low, averaging about .25, and there was no indication that accuracy of prediction varied according to instructional method.

Discussion and Summary

In terms of time and criterion test scores there was clearly no difference in effectiveness between self-directed and linear use of the individualized geography programs. This is understandable in view of reports that actual study procedures differed little. That students preferred self-direction anyway suggests that attitudes toward learning are related to self-direction. If the learning task were structured so as to break up longstanding linear study habits, as it has been in our more recent studies (e.g., Campbell, Bivens, & Terry, 1963), this favorable attitude toward self-direction might facilitate more efficient learning.

Regarding the slightly negative (nonsignificant) effect of premotivating questions, the important factor may be how the Ss construe the questions. The teachers reported that the present Ss mistook the premotivating questions for a test, which they naturally failed, and were thereby discouraged rather than motivated.

The need for more variety in study activity, reported by most teachers, probably has another valid basis in addition to maintaining interest and avoiding monotony. Each unit of the global geography course is a heterogeneous learning task. Highly structured ideas and principles are mixed in closely with discrete, disjoint facts and names. With this kind of topic the best potential for self-direction may be in varying the study activity according to the predominant type of learning required. The final project report will discuss different types of learning and compare results of studies of self-direction for the five prototype learning tasks investigated.

Comparing the individualized program conditions (L and SD units pooled) with regular instruction involving group-paced teacher-led use of the programs showed no clear difference in overall effectiveness. The classes having regular instruction learned more but spent considerably more time at it. The no-program self-directed class (NP), however, learned as much and retained it as well as the other classes geting individualized instruction, and they did so in much less time. The drawback of this method was that the intensity and monotony of studying

from a bare-bones outline presentation of the content became gradually more unpleasant and created a morale problem. Perhaps the implication for effective use of this method is to apply it only briefly and occasionally with the intervening time being spent on less grinding modes of learning.

Finally it should be pointed out that giving students freedom to use programed materials in any way they pleased did not detract from learning. (Nor has it in any study conducted so far.) This surely justifies flexibility in the use of programs if the teacher can thereby save time, trouble or expense.

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APPENDICES

A: First three pages of Mediterranean Climate program

B: Study Guide for Mediterranean Unit

C: Premotivating Questions for Mediterranean Unit

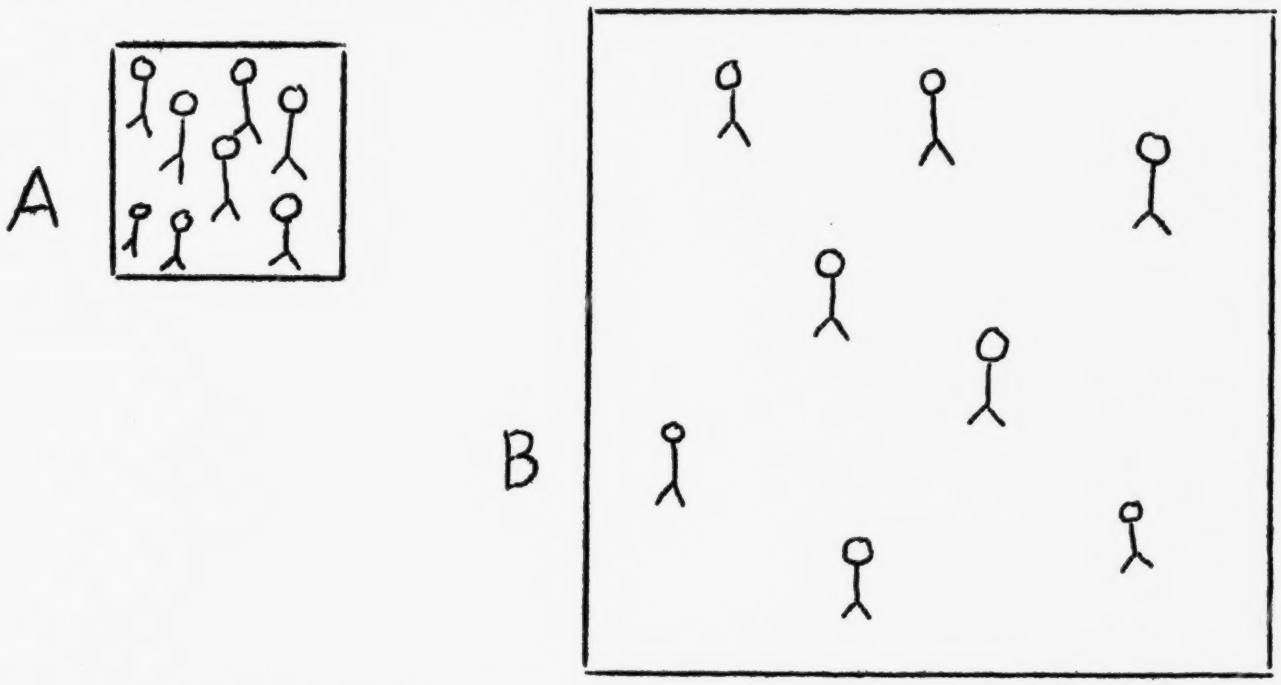
D: Summaries of Analyses of Variance, Classes 1 to 4

E: Post-learning Questionnaire, Classes 1 to 4

Appendix A

MEDITERRANEAN CLIMATE (first 3 pages)

1. Groups A and B each have 8 people. Each person weighs 100 pounds. Which group weighs more: A, B, same?



2. The box around Group A is 1 inch square. The box around Group B is 3 inches square. In each inch of space, there is more weight in Group: A, B, same?

3. Weight per square inch is called pressure.

   A. Each person in Group A weighs 100 pounds. In Group A the pressure per square inch is _____ pounds.

   B. In Group B the pressure per square inch is:

      a. 800 pounds
      b. more than 800 pounds
      c. less than 800 pounds

4. When things are packed close together they are compressed. When things are spread out they are expanded.

   A. Group A is: compressed, expanded?

   B. Group B is: compressed, expanded?

5. Air has weight.
   Which air has more pressure per square inch:

   a. expanded air
   b. compressed air
   c. both the same

MEDITERRANEAN CLIMATE

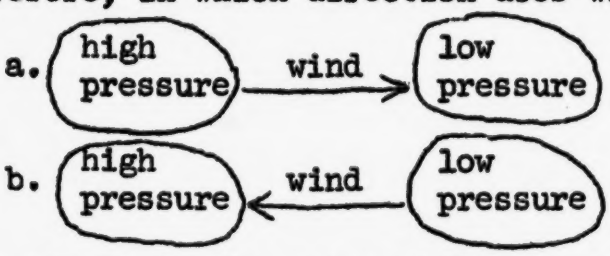
6. When air is warmed, it expands. The warmer it gets the more it expands. When air is cooled, it compresses. The cooler it gets the more it compresses.
Which has more pressure per square inch:

   A. hot air
      cold air

   B. warm air
      cool air

   C. cold air
      cool air

7. Places of greater pressure are called high pressure areas.
Places of lesser pressure are called low pressure areas.
Wind is air flowing from places of higher pressure to places of lower pressure;
therefore, in which direction does wind blow: a, b, both, neither?



8. Draw arrows in the spaces below to show which way the wind will blow:

   A. Hot _____ Cold
   B. Cold _____ Hot
   C. Warm _____ Cool
   D. Cool _____ Warm
   E. Hot _____ Warm
   F. Warm _____ Warmer
   G. Cooler _____ Cool
   H. Hot _____ Hotter
   I. Cold _____ Colder

9. Year around in the Horse Latitudes, air is:

   a. falling
   b. rising

10. Falling air:

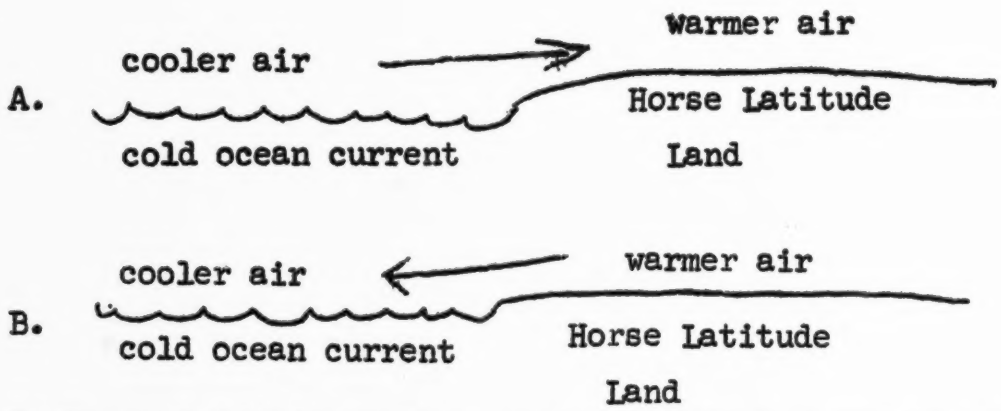
   a. warms
   b. cools

MEDITERRANEAN CLIMATE

11. The air over cold ocean currents is:

    a. warm
    b. cool

12. In which direction will wind blow at the coast: A, B?



13. In Horse Latitude regions near cold ocean currents wind blows:

    a. toward the land
    b. away from the land

14. Cool air can hold:

    a. much moisture
    b. little moisture

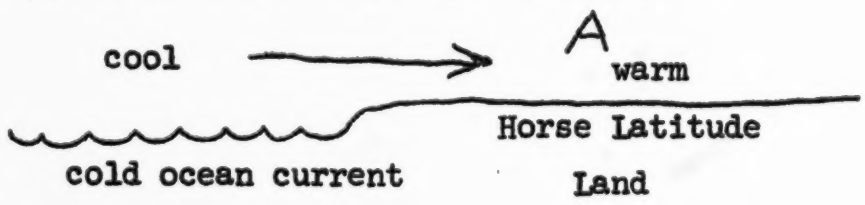
15. Wind from cold ocean currents will:

    a. bring much moisture to the land
    b. bring little moisture to the land

16. Air loses its moisture when it:

    a. warms
    b. cools

17. At A the wind is: warming, cooling?



    A. Re-read Nos. 16 and 17.
    There will be rainfall at A: Yes No?

18. In the Horse Latitudes places near cold ocean currents receive:

    a. much rainfall
    b. little or no rainfall

Appendix B

MEDITERRANEAN CLIMATE STUDY GUIDE

Concept	Items
A. Wind is air moving along the surface of the earth from places of greater pressure to lesser pressure. Therefore, wind blows from cooler places toward warmer places.	1 - 8
B. In the Horse Latitudes near cold ocean currents the land is warmer than the ocean. Therefore, the wind blows toward the land. Winds from cold ocean currents are cool and rather dry.	9 - 15
1. Air loses its moisture only when it cools. Cool, rather dry air blowing over warm land will not lose its moisture unless it is lifted by mountains.	16 - 21
2. Horse Latitude regions near cold ocean currents are not deserts if mountains are near the coast.	22 - 23
C. Southern California is in the Horse Latitudes near a cold ocean current but is not a desert because mountains are near the coast.	24 - 32
1. Most of Southern California's rain is in winter because during that season the mountains are cold enough to cause the cool air to lose its moisture.	33 - 35
2. Southern California is cooler than Horse Latitude regions far from the ocean because it is cooled by ocean breezes.	36 - 37
D. Places like Southern California, that are in the Horse Latitudes, near a cold ocean current, and which have mountains near the coast have <u>Mediterranean Climate</u>.	38 - 42
1. Places with Mediterranean Climate are scrub forest.	43
E. Mediterranean Climates are well suited for: oranges, lemons, grapes, olives, and other fruits.	44 - 54
F. Mediterranean Climates of the World:	55 - 80
1. Atlas Mountain region of North Africa	55 - 63
2. Israel	64
3. Southern Europe	65 - 74
4. Cape Town region of South Africa	75 - 76
5. Perth and Adelaide region of Australia	77
6. Santiago region of Chile	78

Concept	Items
G. Horse Latitude regions near warm ocean currents are called Humid Sub-Tropical Climates. They receive heavy rainfall.	81 - 95
H. Three types of climate occur in the Horse Latitudes:	96
a. deserts -- inland far from the ocean	
b. deserts -- near cold ocean currents if no mountains are near the coast	
c. Mediterranean Climate -- near cold ocean currents if mountains are near the coast	
d. Humid Sub-Tropical Climate -- near warm ocean currents	
1. Cold ocean currents occur on the west coast of continents. Warm ocean currents occur on the east coast of continents; therefore, Mediterranean Climates always occur on the west coast of continents; Humid Sub-Tropical Climates always occur on the east coast of continents.	

Appendix C

(Premotivating Questions for Mediterranean Unit)

The Mediterranean Climate lesson that you will be doing next gives the answers to the questions below but, before you do the lesson, see how much you already know about Mediterranean Climates by trying to answer the questions now.

1) Why are many aircraft industries located in Southern California?

2) Why does Southern California get most of its rain in the winter?

3) Why is the movie industry located in Southern California?

4) Why are oranges one of the major crops of Southern California?

5) Southern California and Albuquerque, New Mexico are at the same latitude. Why don't they have the same climate?

6) What would happen to the climate in Southern California if the Coast Range were cut down and hauled away to make room for more houses?

7) Does any other part of the world have a climate like that of Southern California?

8) We live in what kind of climate?

   a) tropical rain forest
   b) desert
   c) grasslands
   d) tundra
   e) none of these

   Why?

Appendix D

Analyses of Scores on the First Posttest Taken in Each Unit, and of Corresponding Study Times (Min.).

Independent Variables:

M: Method of learning (L vs. SD)

P: Premotivating questions (vs. none)

U: Unit (Mediterranean vs. Monsoon). This main effect is of no consequence since the units and tests were of different lengths.

Source of Variance	Analysis of Scores			Analysis of Study Times		
	df	SS	F	df	SS/100	F
Between Ss	108	5146		101	5636	
Between Classes	3	384	2.8*	3	1561	12.5***
P	1	145	3.2	1	71	1.7
M x U	1	5		1	20	
M x U x P	1	245	5.4*	1	1387	33.5***
Within Classes (error b)	105	4762		98	4075	
Within Ss	109	4683		102	2677	
U	1	3408	323.3***	1	862	54.9***
M	1	26	2.5	1	4	
U x P	1	0		1	241	15.3***
M x P	1	142	13.5***	1	35	2.2
Error (w)	105	1107		98	1540	
Total	217	9829		203	8313	

* $p < .05$

*** $p < .001$

Appendix E

Student Questionnaire

Name _____

Date _____

Teacher _____

For the geography unit on the Mediterranean Climate you used one study method, and you used a different method of study with the unit on the Monsoon Climate. Think about both of them for a minute and then indicate which of the two study methods you liked better by checking one of the statements below:

_____ I definitely liked the method we used in studying the Mediterranean Climate better.

_____ I liked the method we used in studying the Mediterranean Climate a little better.

_____ I liked them about the same.

_____ I liked the method we used in studying the Monsoon Climate a little better.

_____ I definitely liked the method we used in studying the Monsoon Climate better.

By which study method do you think you learn fastest? (check one)

_____ Method used on Mediterranean Unit

_____ Method used on Monsoon Unit.

In the space below (and on the back if needed), tell why you liked one way of studying better (if you did), and why you learned better one way than the other. Write any other comments you think might help us to prepare this lesson for next year's students: